


**User Manual**

# Fastrack Supreme IESM-IO+USB+GPS

Reference: **WA_DEV_Fastrk_UGD_008**

Revision: **001**

Date: **October 3, 2007**

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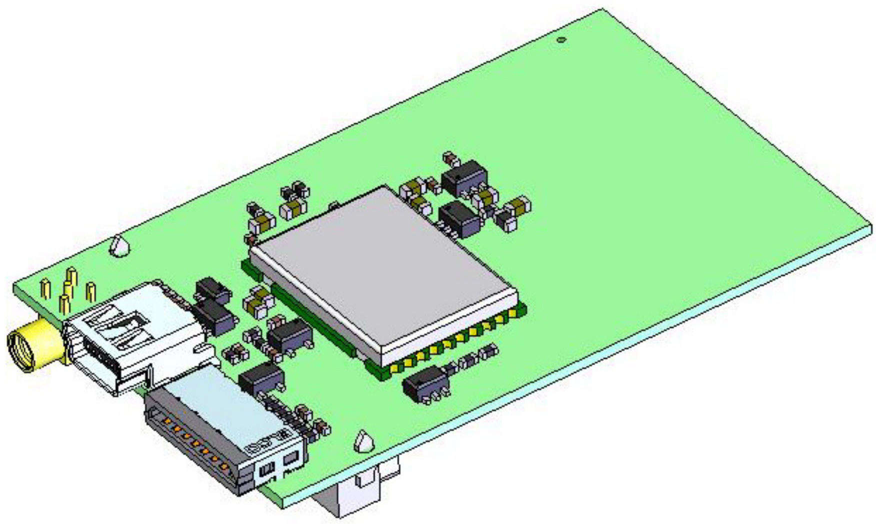
# Plug and Play Fastrack Supreme Wireless CPU®

# IESM-IO+USB+GPS User Guide

Reference: WA_DEV_Fastrk_UGD_008

Revision: 001

Date: 03 October 2007



# Document History

| Revision | Date | List of revisions | |
|---|---|---|---|
| 001 | 06 June, 07 | First Issue | |
| | 03 October, 07 | Update | |
| | | | |

# Overview

The Internal Expansion Socket Module (IESM) is a Plug & Play device to expand the functionality of a standard Fastrack Supreme 10 and Supreme 20 into a state of the art IO+USB+GPS device for machine to machine applications.

With the IESM it is possible to utilize the Internal Expansion Socket (IES) which opens wide applications for Fastrack Supreme 10 and Supreme 20 by simply plugging in.

Fastrack Supreme with IESM-IO+USB+GPS plugged-in may utilize one or more AT Plug-Ins of the powerful Open AT® software suite. Open AT® is the world's most comprehensive cellular development environment, which allows embedded standard ANSI C applications to be natively executed directly on the Wireless CPU®.

Topics covered by this document;

- General description
- Functional description
- Basic services available
- Technical characteristics
- Installing and using the IESM-IO+USB+GPS
- User-level troubleshooting
- Recommended accessories to be used with the product

Note 1:

This document covers the IESM-IO+USB+GPS Plug & Play alone and does not include;

- The programmable capabilities provided via the use of Open AT® Software Suites.
- The development guide for IESM for expanding the application feature through the IES interface.

For details, please refer to the documents shown in the "Reference documents" section.

Note 2:

To use the IESM-IO+USB+GPS for Fastrack Supreme, the GPS Feature must be activated first. This activation is specific to GPS application which is made during Fastrack Supreme production.

To verify, enter "AT+WCFM=5". If Fastrack Supreme responds "+WCFM: 00000031, 0", this means it is not activated. Please contact your nearest distributor for assistance before installing IESM-IO+USB+GPS.

## RoHS Directive

The Fastrack Supreme and IESM-IO+USB+GPS are now compliant with RoHS Directive 2002/95/EC, which sets limits for the use of certain restricted hazardous substances. This directive states that "from 1st July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE)".

Plug & Plays which are compliant with this directive are identified by the RoHS logo on their label.

## Disposing of the product

This electronic product is subject to the EU Directive 2002/96/EC for Waste Electrical and Electronic Equipment (WEEE). As such, this product must not be disposed off at a municipal waste collection point. Please refer to local regulations for directions on how to dispose off this product in an environmental friendly manner.

# Cautions

Information furnished herein by WAVECOM is accurate and reliable. However, no responsibility is assumed for its use. Please read carefully the safety recommendations given in Chapter 10 for an application based on Fastrack Supreme Plug & Play.

IESM are ESD sensitive, it is recommended to use standard ESD precautions, as described in the following norm:

JEDEC standard JESD625-A, Requirements for Handling Electrostatic Discharge-Sensitive (ESDS) Devices.

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# Web Site Support

| | |
|---|---|
| General information about Wavecom and its range of products: | www.wavecom.com |
| Specific support is available for the Fastrack Supreme Plug & Play Wireless CPU®: | www.wavecom.com/fastracksupreme |
| Carrier/Operator approvals: | www.wavecom.com/approvals |
| Open AT® Introduction: | www.wavecom.com/OpenAT |
| Developer support for software and hardware: | www.wavecom.com/forum |

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# 1 References

## 1.1 Reference Documents

For more details, several reference documents may be consulted. The Wavecom reference documents are provided in the Wavecom documents package contrary to the general reference documents, which are not Wavecom owned.

### 1.1.1 Open AT® Software Documentation

[1] Getting started with Open AT® SDK v4.22 (Ref.WM_DEV_OAT_UGD_048)

[2] Tutorial for Open AT® IDE V1.04 (Ref. WM_DEV_OAT_UGD_044)

[3] Tools Manual for Open AT® IDE V1.04 (Ref. WM_DEV_OAT_UGD_045)

[4] Basic Development Guide for Open AT®V4.21
(Ref. WM_DEV_OAT_UGD_050)

[5] ADL User Guide for Open AT®V4.21 (Ref. WM_DEV_OAT_UGD_051)

[6] Open AT® v4.22 Official Release Note (Ref. WM_DEV_OAT_DVD_338)

### 1.1.2 AT Software Documentation (TB Updated with X.61)

[7] AT commands interface Guide for FW v6.63
(Ref. WM_DEV_OAT_UGD_049)

[8] Open AT® Firmware v6.63 Customer Release Note
(Ref.WM_PGM_OAT_CRN_001)

### 1.1.3 Fastrack Supreme Related Documents

[9] Fastrack Supreme User Guide (Ref. WA_DEV_Fastrk_UGD_001)

### 1.1.4 IESM Related Documents

[10] IESM Product Technical Specifications (Ref. WA_DEV_Fastrk_PTS_001)

[11] C-GPS Overview and Usage (Ref. WA_DEV_C-GPS_APN_001_001)

[12] IESM-IO+USB+GPS Installation Guide (Ref.WA_Dev_Fastrk_UGD_007)

Note:

New versions of software may be available. Wavecom recommends customers to check the web site for the latest documentation.

## 1.2 Abbreviations

| Abbreviation | Definition |
|---|---|
| AC | Alternating Current |
| ACM | Accumulated Call Meter |
| AT | ATtention (prefix for Wireless CPU® commands) |
| CLK | CLocK |
| CMOS | Complementary Metal Oxide Semiconductor |
| CS | Coding Scheme |
| CTS | Clear To Send |
| dB | Decibel |
| dBc | Decibel relative to the Carrier power |
| dBi | Decibel relative to an Isotropic radiator |
| dBm | Decibel relative to one milliwatt |
| DC | Direct Current |
| DCD | Data Carrier Detect |
| DCE | Data Communication Equipment |
| DCS | Digital Cellular System |
| DSR | Data Set Ready |
| DTE | Data Terminal Equipment |
| DTMF | Dual Tone Multi-Frequency |
| DTR | Data Terminal Ready |
| EEPROM | Electrically Erasable Programmable Read-Only Memory |
| EFR | Enhanced Full Rate |
| E-GSM | Extended GSM |
| EMC | ElectroMagnetic Compatibility |
| EMI | ElectroMagnetic Interference |
| ESD | ElectroStatic Discharges |
| ETSI | European Telecommunications Standards Institute |
| FIT | Series of connectors (micro-FIT) |
| FR | Full Rate |
| FTA | Full Type Approval |
| GCF | Global Certification Forum |
| GND | GrouND |
| GPIO | General Purpose Input Output |
| GPRS | General Packet Radio Service |

| Abbreviation | Definition |
|---|---|
| GPS | Global Positioning System |
| GSM | Global System for Mobile communications |
| HR | Half Rate |
| I | Input |
| IEC | International Electrotechnical Commission |
| IES | Internal Expansion Socket |
| IESM | Internal Expansion Socket Module |
| IMEI | International Mobile Equipment Identification |
| I/O | Input / Output |
| LED | Light Emitting Diode |
| MAX | MAXimum |
| ME | Mobile Equipment |
| MIC | MICrophone |
| Micro-Fit | Family of connectors from Molex |
| MIN | MINimum |
| MNP | Microcom Networking Protocol |
| MO | Mobile Originated |
| MS | Mobile Station |
| MT | Mobile Terminated |
| NOM | NOMinal |
| O | Output |
| Pa | Pascal (for speaker sound pressure measurements) |
| PBCCH | Packet Broadcast Control CHannel |
| PC | Personal Computer |
| PCL | Power Control Level |
| PDP | Packet Data Protocol |
| PIN | Personal Identity Number |
| PLMN | Public Land Mobile Network |
| PUK | Personal Unblocking Key |
| RF | Radio Frequency |
| RFI | Radio Frequency Interference |
| RI | Ring Indicator |
| RMS | Root Mean Square |
| RTS | Request To Send |
| RX | Receive |

| Abbreviation | Definition |
| --- | --- |
| SIM | Subscriber Identification Module |
| SMA | SubMiniature version A RF connector |
| SMS | Short Message Service |
| SNR | Signal-to-Noise Ratio |
| SPL | Sound Pressure Level |
| SPK | SpeaKer |
| SRAM | Static RAM |
| TCP/IP | Transmission Control Protocol / Internet Protocol |
| TDMA | Time Division Multiple Access |
| TU | Typical Urban fading profile |
| TUHigh | Typical Urban, High speed fading profile |
| TX | Transmit |
| TYP | TYPical |
| USB | Universal Serial Bus |
| VSWR | Voltage Stationary Wave Ratio |

# 2 Packaging

## 2.1 Contents

The complete package contents of the Fastrack IESM-GPS+USB+IOIESM-IO+USB+GPS consists of the following:

- One piece packaging box (A)
- 100 pieces IESM-IO+USB+GPS (B)
- 100 pieces Backplate and Spring Contact (C)
- 3 Pieces Extraction Tool (D)
- Installation Guide (E)

| | |
|---|---|
|  |  |
| Packaging Box (A) | Backplate Box Opened |

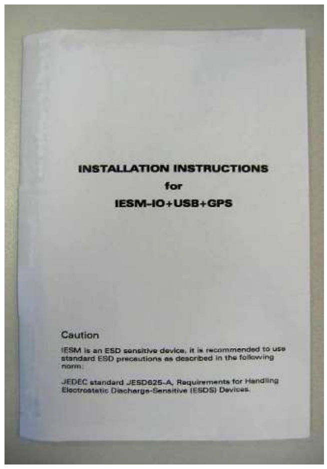
| | | | |
|---|---|---|---|
|  |  |  |  |
| IESM-IO+USB+GPS (B) | Backplate and Contact Spring (C) | Extraction Tool (D) | Installation Manual (E) |

Figure 1: Complete package contents

## 2.2 Packaging Box

The packaging box external dimensions:

- width: 290 mm
- height: 65 mm
- length: 455 mm

Label placed indicates:

- WAVECOM logo
- Product reference (IESM-GPS+USB+IO)
- CE mark
- RoHS Logo



Figure 2: Packaging box

The packaging label dimensions are:

- height: [TBD] mm
- length: [TBD] mm

## 2.3 Production Sticker

A production sticker (see

Figure 3) located at the back side with the following information:

- Product Name (IESM IO+USB+GPS),
- Marketing Name (FSUE03),
- Barcode
- 17 Digit Serial Number




Figure 3: Production sticker

# 3 General Information

## 3.1 Description

The IESM-IO+USB+GPS description is shown below.

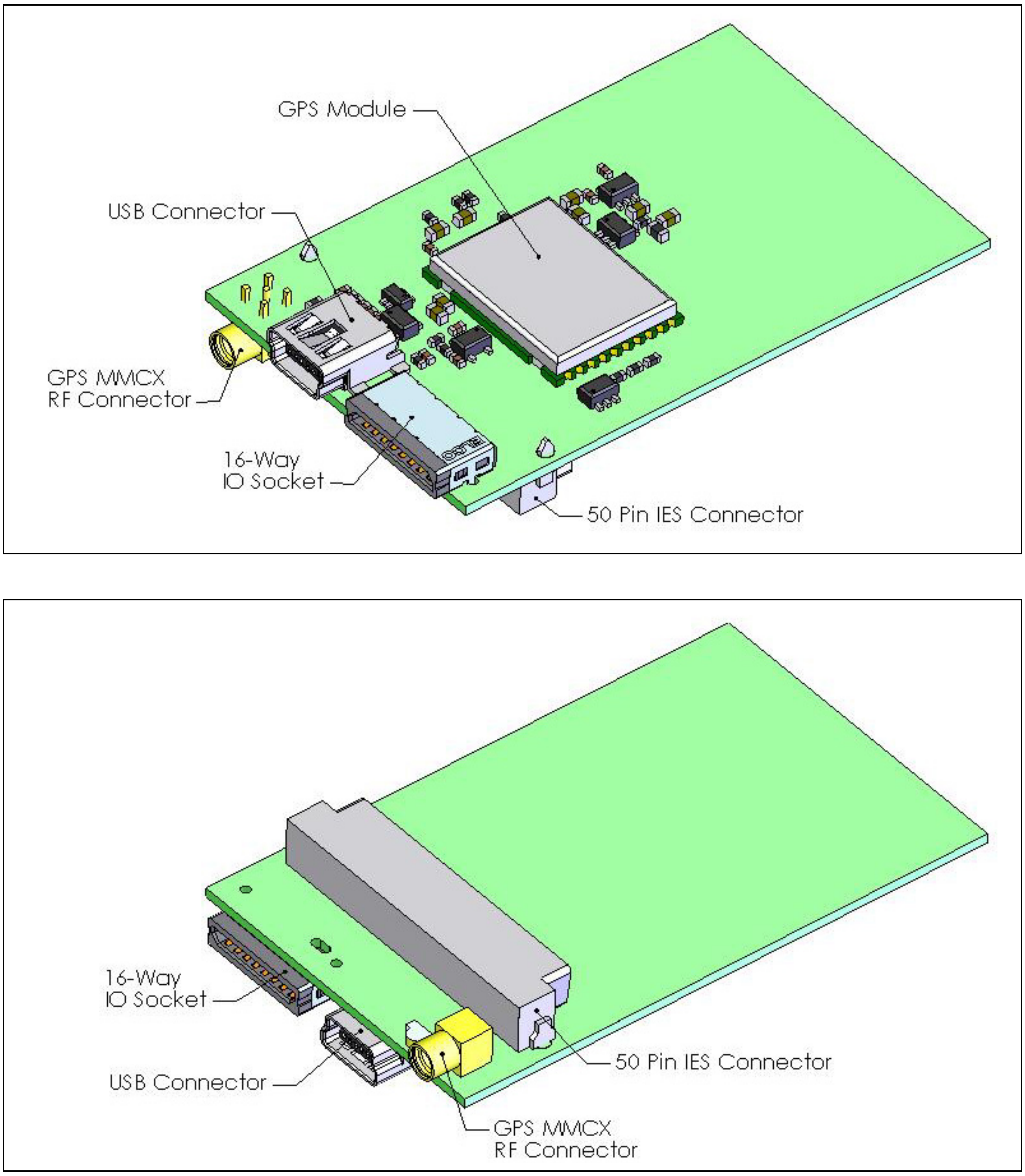



Figure 4: IESM general description

## 3.2 External Connections

### 3.2.1 GPS Antenna Connector

The GPS antenna connector is an MMCX type connector for a 50 Ω RF connection. 3.3VDC is available on this connector for supplying GPS active antennas. This supply can be turned ON or OFF using AT Command.

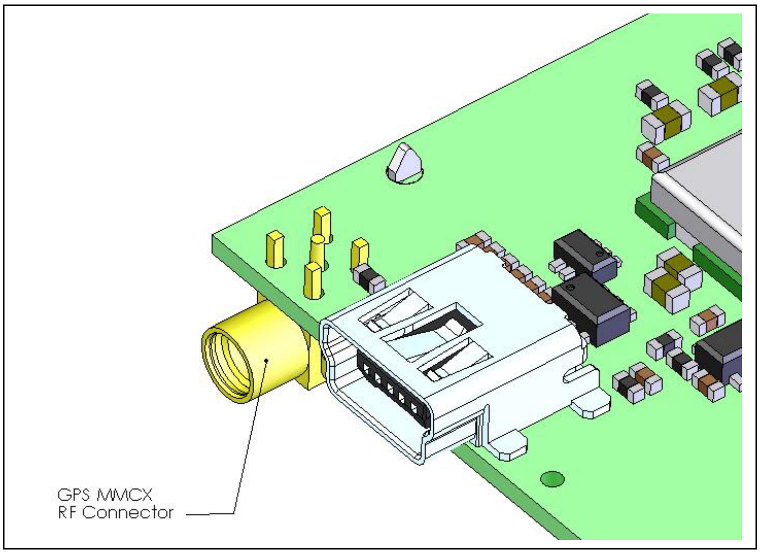



Figure 5: MMCX connector for antenna connection

### 3.2.2 Mini-B USB Connector

Standard Mini-B USB connector for communicating with:

- Wireless CPU

This port is USB 2.0 compliant.

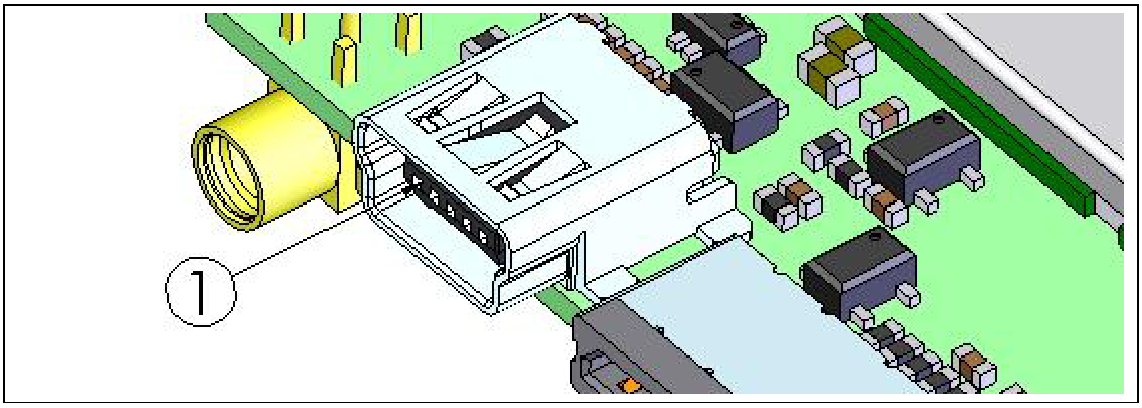



Figure 6: USB connector

For USB connector specifications please refer to Chapter 10, "Connector and Peripheral Devices References".

Table 1: USB Pin Description

| Pin # | Pin Description |
|---|---|
| 1 | VBUS |
| 2 | D- |
| 3 | D+ |
| 4 | NC |
| 5 | GND |

## 3.3 External Connections

### 3.3.1 16-Way IO Socket

The 16-Way IO expander socket is an external interface for the IESM for customer's applications.

Available on this socket;

- 2 - GPIOs
- 1 – AUX-DAC
- 1 – AUX-ADC
- 1 – SPI1 (SPI1-IO, SPI-I1, SPI1-CLK, SPI1-CS)
- GPS Status Indicator Output

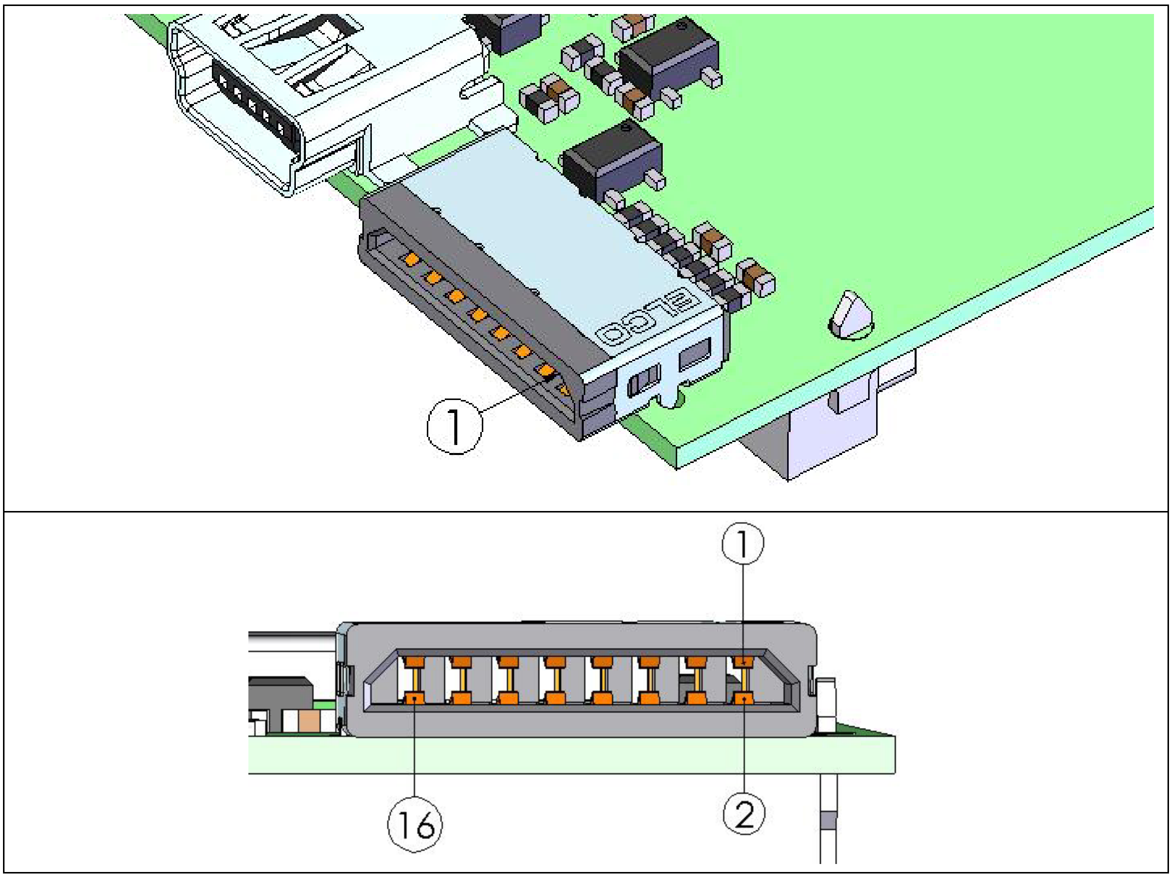



Figure 7: 16-Way IO Expander Socket

For 16-Way connector specifications please refer to Chapter 10, "Connector and Peripheral Devices References".

Table 2: 16-Way IO Expander Description

| Pin # | Pin Description | Pin # | Pin Description |
|---|---|---|---|
| 1 | Not Connected | 9 | GPIO26 |
| 2 | Not Connected | 10 | AUX-DAC |
| 3 | Not Connected | 11 | AUX-ADC |
| 4 | Not Connected | 12 | SPI1-IO |
| 5 | Not Connected | 13 | SPI1-I |
| 6 | GPS Status Indicator | 14 | SPI1-CLK |
| 7 | GPIO27 | 15 | SPI1-CS |
| 8 | Not Connected | 16 | GND |

### 3.3.2 General Purpose Input/Output

The IESM-IO+USB+GPS provide in total of 6 General Purpose I/O and available only if the multiplexed counterpart is not used. These can be used to control any external devices such as a GPS, Bluetooth, LCD or other customer external applications.

Table 3: Pin Description of GPIOs

| Signal | Pin number | I/O | I/O type* | Reset state | Multiplexed with |
|---|---|---|---|---|---|
| GPIO26 | 9 | I/O | Open Drain | Z | SCL |
| GPIO27 | 7 | I/O | Open Drain | Z | SDA |
| GPIO28 | 14 | I/O | 2V8 | Z | SPI1-CLK |
| GPIO29 | 12 | I/O | 2V8 | Z | SPI1-IO |
| GPIO30 | 13 | I/O | 2V8 | Z | SP1-I |
| GPIO31 | 15 | I/O | 2V8 | Z | ~SPI1-CS |

### 3.3.3 IES 50-pin Connector

IESM high density 50-pin connector is used for:

- IESM Interface with Fastrack Supreme motherboard

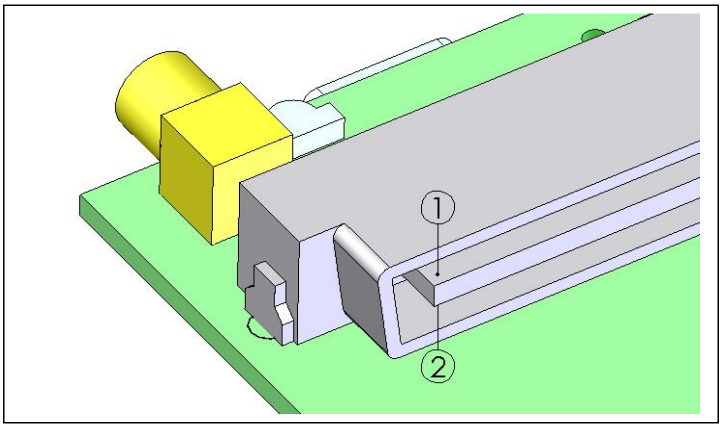



Figure 8: IESM 50-pin connector

For IESM 50-Pin connector specifications please refer to Chapter 10, "Connector and Peripheral Devices References".

Table 4: IESM 50-pin connector description

| Pin # | Pin Description | Pin # | Pin Description |
|---|---|---|---|
| 1 | GND | 26 | RTS2 |
| 2 | GND | 27 | SHTDN |
| 3 | Reserved | 28 | GPIO26 |
| 4 | Reserved | 29 | GPIO19 |
| 5 | Reserved | 30 | GPIO27 |
| 6 | Reserved | 31 | GPIO20 |
| 7 | VPAD-USB | 32 | INT0/GPIO3 |
| 8 | USB-DP | 33 | GPIO23 |
| 9 | USB-DM | 34 | GPIO22 |
| 10 | GSM-1V8 | 35 | DTR1-CT108/2 |
| 11 | GSM-2V8 | 36 | PCM-SYNC |
| 12 | BOOT | 37 | PCM-IN |
| 13 | RESET | 38 | PCM-CLLK |
| 14 | AUX-ADC | 39 | PCM-OUT |
| 15 | SPI1-CS | 40 | AUX-DAC |

| Pin # | Pin Description | Pin # | Pin Description |
|---|---|---|---|
| 16 | SPI1-CLK | 41 | VCC-2V8 |
| 17 | SPI1-I | 42 | GND |
| 18 | SPI1-IO | 43 | DC-IN |
| 19 | SPI2-CLK | 44 | DC-IN |
| 20 | SPI2-IO | 45 | GND |
| 21 | SPI2-CS | 46 | 4V |
| 22 | SPI2-I | 47 | 4V |
| 23 | RXD2 | 48 | GND |
| 24 | TXD2 | 49 | GND |
| 25 | CTS2 | 50 | GND |

# 4 IESM IO+USB+GPS Basic Requirements

IESM IO+USB+GPS require the necessary environment to function properly.

## 4.1 GPS Requirements

- GPS feature must first be activated on the Fastrack Supreme, please consult your distributor regarding this matter.
- Companion GPS (C-GPS) library must be loaded to Fastrack Supreme. This can be found on the Open AT SDK V4.22 or later versions.
- Wavecom's sample Open AT GPS application must be running on the Fastrack Supreme. or customer's own developed application.

## 4.2 USB Requirements

- USB driver for Fastrack Supreme

# 5 Features and Services

## 5.1 Basic Features and Services

Basic features of the IESM-IO+USB+GPS are summarized in the table below.

Table 5: Basic features of IESM-IO+USB+GPS

| Features | Description |
|---|---|
| Open AT® | Open AT® programmable:<br>Native execution of embedded standard ANSI C applications,<br>Custom AT command creation,<br>Custom application library creation,<br>Standalone operation. |
| GPS Standard | GPS L-Band (1575.42MHz) C/A Code |
| Interfaces | USB 2.0 Compliant<br>AT command set based on V.25ter and GSM 07.05 & 07.07.<br>Open AT® interface for embedded application. |

# 6 Technical Characteristics

## 6.1 Mechanical Characteristics

Table 6: Mechanical characteristics

| | |
|---|---|
| PCB Dimensions | 58mm x 35.7mm x 1mm |
| Overall Dimension | 59.5 x 35.7 x 10.01mm (including connectors) |
| Weight | < 10 grams |

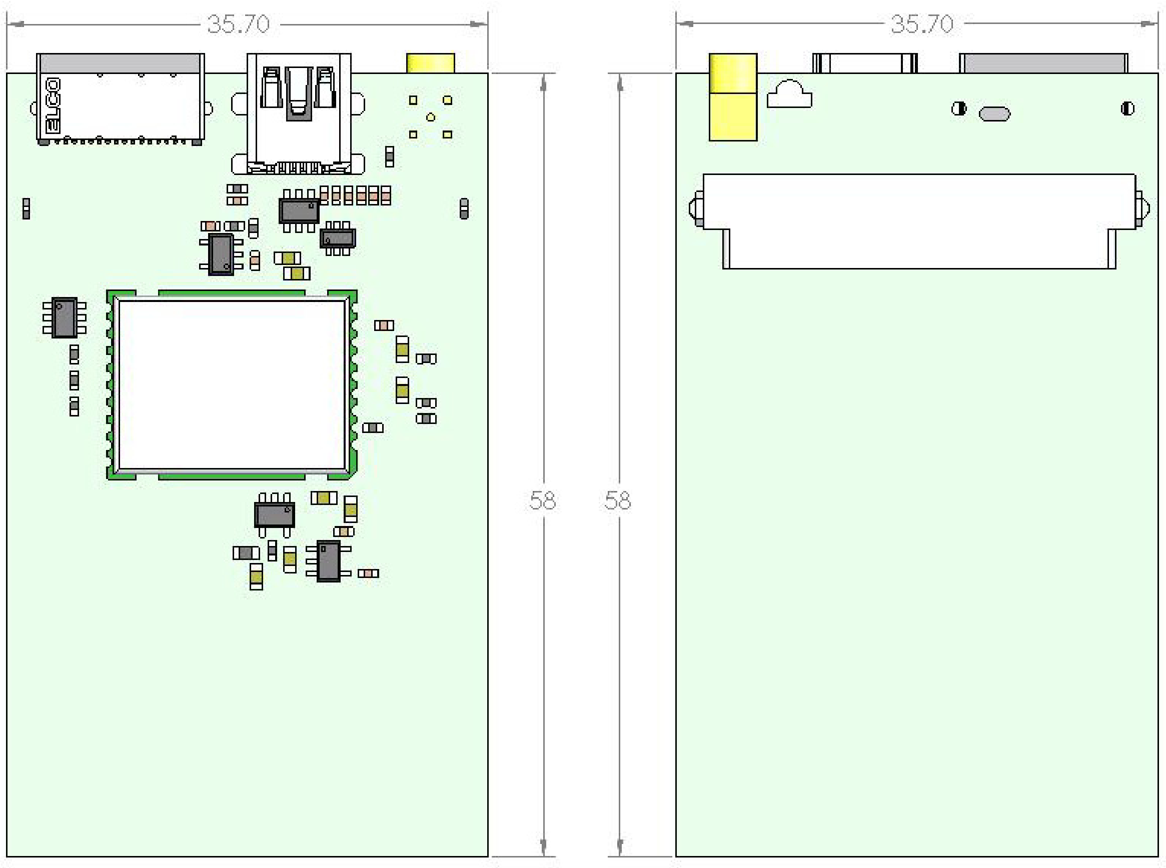



Figure 9: IESM-IO+USB+GPS Dimensions

# 7 Using Fastrack Supreme IESM-IO+USB+GPS

## 7.1 Getting Started

### 7.1.1 Installing IESM-IO+USB+GPS

To install the IESM-IO+USB+GPS please follow the procedures below. It is important to remove the power to Fastrack Supreme when performing this installation;

1. Remove the screws and the original backplate cover of the Fastrack Supreme
2. Insert the IESM-IO+USB+GPS board. Replace the original backplate with the IESM-IO+USB+GPS backplate provided and place back the screws.

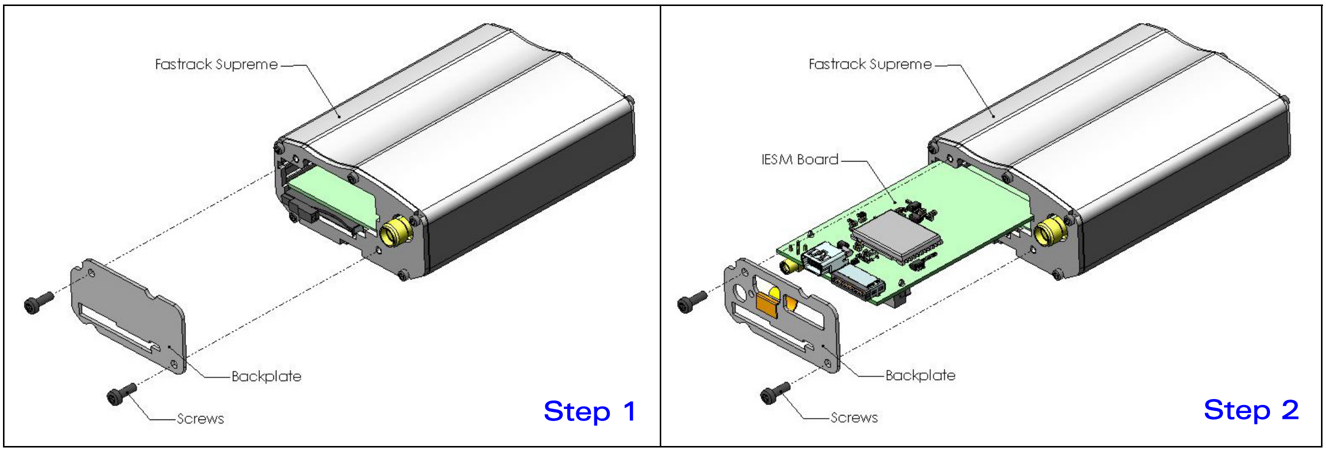



Figure 10: IESM-IO+USB+GPS Mounting

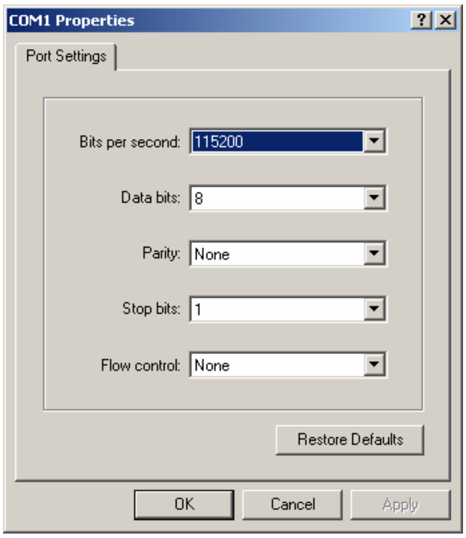
### 7.1.2 IESM-IO+USB+GPS Quick Check

To check if the installation of the IESM-IO+USB+GPS with Fastrack Supreme is ok, please perform a simple test on USB.

1 Connect a serial cable between Fastrack Supreme and PC COM port

2 Apply power on Fastrack Supreme

3 Open communication software (Hyperterminal), if COM port not configured yet please enter as follows;




4 Activate the USB port, enter AT command shown below;

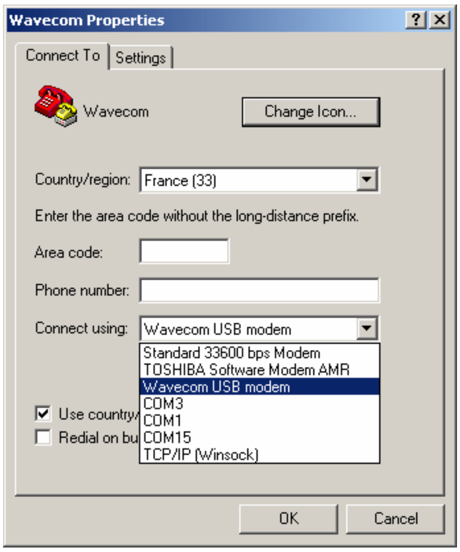
AT+WMFM=0,1,3

5 Connect USB cable between IESM and PC

6 PC running Windows should detect the new USB device. It will prompt to install the USB driver.

7 Install the USB driver on Fastrack Supreme, driver could be found on SDK V4.22.

8 Once USB driver is installed, open a new connection this time configure it to use the USB port




9 On the new communication window type the AT command shown below. This will echo on the screen what is being typed;

ATE1➔ Fastrack Supreme responds “OK”

10 Enter the AT command as indicated below to check the manufacturer identification;

AT+CGMI ➔ Fastrack Supreme responds “WAVECOM MODEM”

IESM is now properly installed. For further information on these AT commands and their associated parameters, refer to "AT Commands Interface Guide" [7].

### 7.1.3 GPS Check

Make sure the necessary GPS environment is already set-up in Fastrack Supreme.

- GPS feature must be activated
- C-GPS library is loaded
- Companion GPS sample code or customer Open AT application is loaded
- Apply power to Fastrack Supreme

| AT Command | Response | Remarks |
|---|---|---|
| AT+WOPEN=1 | OK | Activates the C-GPS Sample Code |
| AT+NMEA=1 | OK | Specifies that the NMEA frames sent in standard format |
| AT+CGPS=2 | OK | Specifies the UART2 is used by GPS module |
| AT+CONFIG=1 | OK | Saves the configuration |

If everything is followed carefully the Fastrack Supreme should start sending the NMEA frames to the PC COM port.

#### 7.1.4 GPS Active Antenna Supply Activation

GPS Active Antenna power supply by default is disabled. This can be activated with the following AT Commands.

The power enable is controlled by GPIO8.

Enabling the active antenna power supply

| AT Command | Response | Remarks |
|---|---|---|
| AT+WHCNF=0,0 | OK | Deactivates the Keypad feature of Fastrack Supreme |
| AT+WIOM=8,1,0 | OK | Activates GPIO8 as an output and low at initial state |
| AT+WIOW=8,0 | OK | Sends a low to GPIO8 and enables the 3.3V supply output |

Note:

Once the power is removed from Fastrack Supreme at the next power ON the GPS active antenna supply will be activated automatically in a condition where the Open AT® C-GPS is also running.

If Open AT® C-GPS is turned OFF, the active antenna power supply will also power OFF.

Turning ON/OFF the active antenna power supply

| AT Command | Response | Remarks |
|---|---|---|
| AT+WIOW=8,1 | OK | Sends a high to GPIO8 and disables the 3.3V supply output |
| AT+WIOW=8,0 | OK | Sends a low to GPIO8 and enables the 3.3V supply output |

Note:

If AT+WIOM=8,1,0 is entered initially, regardless of the status of GPIO8 before power OFF at next power ON the GPIO8 will always be at low level at initial state.

Changing to AT+WIOM=8,1,1 will alter the initial state of GPIO8 to high, at the next power ON GPIO8 will always be at high level at initial state.

## 7.2 IESM-IO+USB+GPS Operational Status

The IESM-IO+USB+GPS operational status could be interpreted by the green LED status located near the GPS RF connector.

| LED Status | LED light activity | M1306B status |
|---|---|---|
| ON | LED ON | GPS fix has not been achieved |
| | LED Blinking | GPS Fix has been achieved |
| OFF | LED OFF | Fastrack Supreme is switched OFF or GPS feature Is not activated |

Table 7: IESM-IO+USB+GPS operational status

# 8 Troubleshooting

This section describes possible problems might be encountered when using the Fastrack Supreme IESM-IO+USB+GPS.

To review other troubleshooting information, refer the 'FAQs' (Frequently Asked Questions) page at www.wavecom.com/fastracksupreme

## 8.1 No Communication with IESM-IO+USB+GPS through the Serial Link

If the Fastrack Supreme IES-IO+USB+GPS does not respond to AT commands through the USB or serial link, refer to the table below for possible causes and solutions.

Table 8: Solutions for no connection with Supreme through serial link

| Symptoms | Check if | Action |
|---|---|---|
| Fastrack Supreme UART no response | • Serial cable is connected on both sides? | • Check the serial cable connection<br>• Fastrack Supreme UART factory setting is:<br>▪ Data bits = 8<br>▪ Parity = none<br>▪ Stop bits = 1<br>▪ Baud = 115 200 bps<br>▪ Flow control = hardware |
| | • Power is applied? | • Check Power Cable<br>• Check Fuse |
| | • There is another program interfering with the communication program (i.e. Conflict on communication port access) | • Close the interfering program |
| USB not detected | • USB cable properly inserted? | • Unplug cable from PC. Then plug back again if possible on another USB port on the PC. |
| | • IESM powered properly? | • Make sure the IESM is plugged securely to the Fastrack Supreme |
| USB does not respond | • USB port activated? | • Send AT+WMFM=0,1,3 to activate USB |
| | • USB driver installed? | • Install USB driver (from SDK V4.22) |
| GPS not sending data | • Open AT® application running? | • Run the Open AT® and GPS AT Plug-In |

# 9 Functional Description

The IESM-IO+USB+GPS is interfaced to the Fastrack Supreme mother board through the 50 pin connector. All the DC supplies are applied through this connector so no external supply is necessary.

With the Open AT® application running, the Fastrack Supreme motherboard communicates to IESM-IO+USB+GPS on UART2. GPS module communicates on UART2 with the following configuration;

- baud rate: 57600 bps
- character framing: 8 Data bits
- parity: 1 stop bit and Odd Parity
- Flow Control: No Flow control

Open AT® application controls the following;

- Enables/disables the internal LDOs of the IESM to power-up the GPS
- Enables/disables the RF block of the GPS
- Enables a trigger to reset the GPS module
- GPS status indicator output which is connected to an LED driver
- Enables/disable the GPS antenna bias voltage at 3.3V

USB is a four wire slave interface that complies with USB 2.0 protocol signaling. This can be used to communicate with the Wireless CPU or GPS module.

## 9.1 Architecture

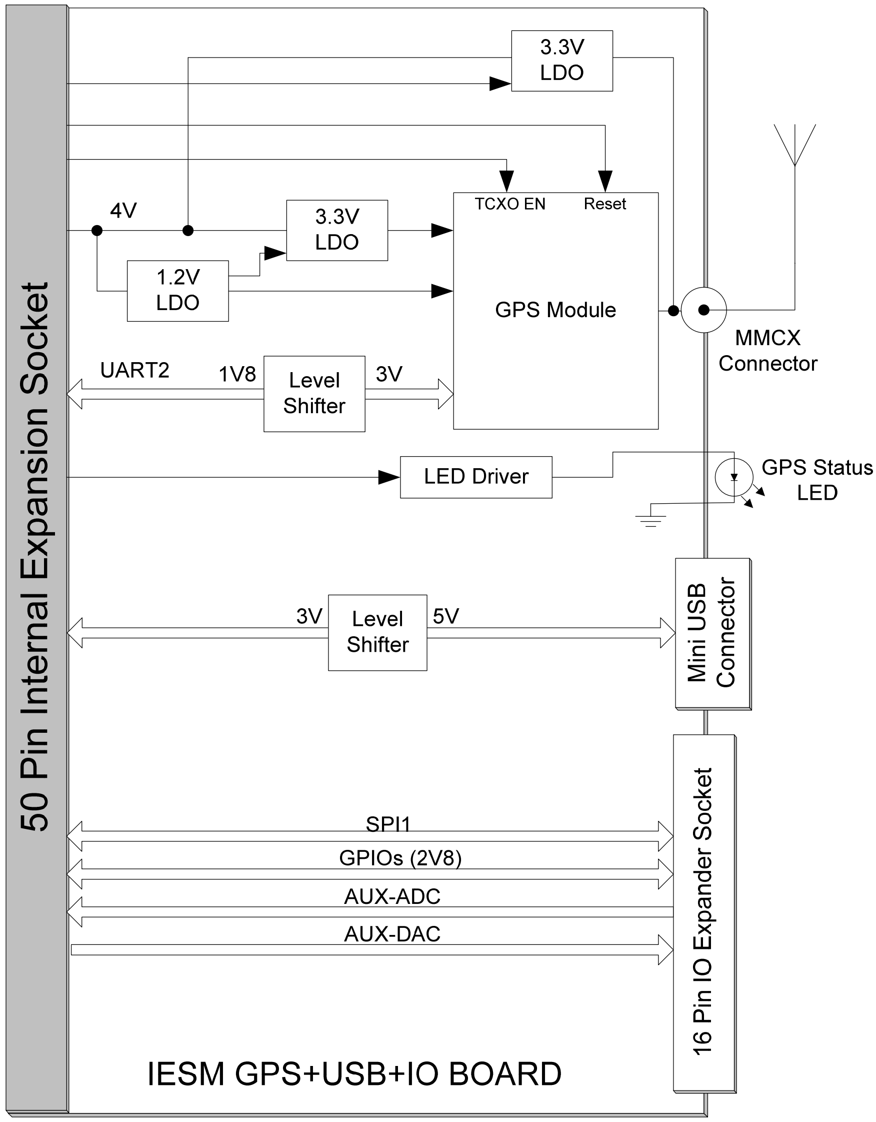



Figure 11: Functional architecture

## 9.2 IESM-IO+USB+GPS Electrical Characteristics

### 9.2.1 Power Supply

Table 9: Electrical characteristics

| | |
|---|---|
| Operating Voltage | 4VDC |

Note:

The IESM-IO+USB+GPS board is powered once the power enable pins are activated by the Open AT® application. The following table describes the consumption at the IES interface based on operating conditions.

Table 10: GPS Power consumption

| Mode | Typ | Unit |
|---|---|---|
| GPS Powered ON | 96 | mA |

Note: The power consumption indicated excludes the active antenna consumption.

### 9.2.2 Extra Current Consumption from the DC-IN Source

Depending on various DC-IN voltage of Fastrack Supreme, the extra current consumption drawn by the GPS feature and the GPS active antenna will be different.

Table 11: Extra Current Consumption from DC-IN Source

| Condition | | Extra current consumption for additional feature (mA) | | |
|---|---|---|---|---|
| Mode | GPS Feature | @5.5VDC | @13.2VDC | @32VDC |
| Connected | GPS Enable with GPS antenna bias ON | 111 | 42 | 22 |
| Non-Connected | GPS Enable with GPS antenna bias ON | 106.7 | 46.3 | 22.6 |
| | GPS Enable with GPS antenna bias OFF | 86.8 | 37.8 | 18.7 |
| | GPS antenna bias ON | 19.8 | 8.5 | 3.8 |

### 9.2.3 RF Characteristics

#### 9.2.3.1 GPS Receiver Frequency

Table 12: GPS Receiver Frequency

| Characteristic | GPS |
|---|---|
| Frequency RX | 1575.42 MHz |

#### 9.2.3.2 GPS RF Performance

The GPS RF performance for receiver is given in the table below.

Table 13: Receiver performances

| Open AT® SDK v 4.11 | Conditions | Notes | Value | Remarks |
|---|---|---|---|---|
| Accuracy | -130 dBm (outdoor) In dynamic mode | 50% percentile | 3.7 m CEP | |
| | -130 dBm (outdoor) In dynamic mode | 95% percentile | 6.8 m CEP | |
| | -140 dBm In dynamic mode | 50% percentile | 6.1 m CEP | |
| | -145 dBm In dynamic mode | 50% percentile | 13.9 m CEP | |
| Velocity Accuracy | Static mode | First fix only | 0.1 m/s | Typ |
| | Static mode | Continuous fixes | 0 m/s | Typ |
| TTFF Hot Start | | Mean | 3.5 s | Typ |
| TTFF Warm Start | | Mean | 30s | Typ |
| TTFF Cold Start | Clear Sky conditions | Mean | 38 s | Typ |
| | Clear Sky conditions | 95% percentile | 45 s | Typ |
| Update Rate | -130 dBm | Continuous fixes | 1 Hz | Typ |

#### 9.2.3.3 External Antenna

The external antenna is connected to the IESM's GPS via the MMCX connector.

The external antenna must fulfill the characteristics listed in the table below.

Table 14: External antenna characteristics

| | |
|---|---|
| Antenna frequency range | 1.57542GHz ± 1.023MHz (L1-Band) |
| Impedance | 50 Ohms nominal |
| Voltage Supply | 3.3V ± 0.5VDC |
| Gain (antenna + cable) | 2dBi |

## 9.3 USB 2.0 Interface

Is a 4-wire Mini USB slave interface that complies with USB 2.0.

The USB interface signals are VPAD-USB, USB-DP, USB-DM and GND.

USB interface features:

- 12Mbit/s full-speed transfer rate
- 5V typ compatible
- USB Softconnect feature
- Download feature is not supported by USB
- CDC 1.1 – ACM compliant

Pin description of the USB interface

| Signal | Mini USB Pin number | I/O | I/O type USB Standard | Description |
|---|---|---|---|---|
| VPAD-USB | 1 | I | VBUS | +5V USB Power Supply |
| USB-DM | 2 | I/O | D- | Differential data interface negative |
| USB-DP | 3 | I/O | D+ | Differential data interface positive |
| ID | 4 | - | - | NC |
| GND | 5 | - | GND | Ground |

## 9.4 Environmental Characteristics

The IESM-IO+USB+GPS is compliant with the following operating class. To ensure the proper operation of the IESM-GPS+USB+IO, the temperature of the environment must be within a specific range as described in the table below.

Table 15: Ranges of temperature

| Conditions | Temperature range |
|---|---|
| Operating / Class A | -20 °C to +55°C |
| Operating / Class B | -30 °C to +65°C |
| Storage | -40 °C to +85°C |

Function Status Classification:

Class A:

The IESM-IO+USB+GPS remain fully functional across the specified temperature range.

Class B:

The IESM-IO+USB+GPS remain fully functional, across the specified temperature range. Some parameters may occasionally deviate from the specified requirements and this deviation does not affect the ability of the IESM-IO+USB+GPS to be fully functional.

The detailed climatic and mechanics standard environmental constraints applicable to the Fastrack Supreme are listed in the next table:

Table 16: Environmental standard constraints

| Environmental Tests (IEC TR 60721-4) | | Environmental Classes (IEC 60721-3) | | | |
|---|---|---|---|---|---|
| | | | | Operation | |
| Tests | Standards | Storage (IEC 60721-3-1) Class IE13 | Transportation (IEC 60721-3-2) Class IE23 | Stationary (IEC 60721-3-3) Class IE35 | Non-Stationary (IEC 60721-3-7) Class IE73 |
| Cold | IEC 60068-2-1 : Ab/Ad | -25°C, 16 h | -40°C, 16 h | -5°C, 16 h | -5°C, 16 h |
| Dry heat | IEC 60068-2-2 : Bb/Bd | +70°C, 16 h | +70°C, 16 h | +55°C, 16 h | +55°C, 16 h |
| Change of temperature | IEC 60068-2-14 : Na/Nb | -33°C to ambient<br>2 cycles, t1=3 h<br>1 °C.min$^{-1}$ | -40°C to ambient<br>5 cycles, t1=3 h<br>t2<3 min | -5°C to ambient<br>2 cycles, t1=3 h<br>0,5 °C.min$^{-1}$ | -5°C to ambient<br>5 cycles, t1=3 h<br>t2<3 min |
| Damp heat | IEC 60068-2-56 : Cb | +30°C, 93% RH<br>96 h | +40°C, 93% RH<br>96 h minimum | +30°C, 93% RH,<br>96 h | +30°C, 93% RH, 96 h |
| Damp heat, cyclic | 60068-2-30 : Db<br>Variant 1 or 2 | +40°C, 90% to 100% RH<br>One cycle<br>Variant 2 | +55°C, 90% to 100% RH<br>Two cycles<br>Variant 2 | +30°C, 90% to 100% RH<br>Two cycles<br>Variant 2 | +40°C, 90% to 100% RH<br>Two cycles<br>Variant 1 |
| Vibration (sinusoidal) | IEC 60068-2-6 : Fc | 1-200 Hz<br>2 m.s$^{-2}$<br>0,75 mm<br>3 axes<br>10 sweep cycles | 1-500 Hz<br>10 m.s$^{-2}$<br>3,5 mm<br>3 axes<br>10 sweep cycles | 1-150 Hz<br>2 m.s$^{-2}$<br>0,75 mm<br>3 axes<br>5 sweep cycles | 1-500 Hz<br>10 m.s$^{-2}$<br>3,5 mm<br>3 axes<br>10 sweep cycles |
| Vibration (random) | IEC 60068-2-64 : Fh | - | 10-100 Hz / 1,0 m$^2$.s$^{-3}$<br>100-200 Hz / -3 dB.octave$^{-1}$<br>200-2000 Hz / 0,5 m$^2$.s$^{-3}$<br>3 axes<br>30 min | - | - |
| Shock (half-sine) | IEC 60068-2-27 : Ea | - | - | 50 m.s$^{-2}$<br>6 ms<br>3 shocks<br>6 directions | 150 m.s$^{-2}$<br>11 ms<br>3 shocks<br>6 directions |
| Bump | IEC 60068-2-29 : Eb | - | 250 m.s$^{-2}$<br>6 ms<br>50 bumps<br>vertical direction | - | - |
| Free fall | ISO 4180-2 | - | Two falls in each specified attitude | - | 2 falls in each specified attitude<br>0,025 m (<1kg) |
| Drop and topple | IEC 60068-2-31 : Ec | - | One drop on relevant corner<br>One topple about each bottom edge | - | One drop on each relevant corner<br>One topple on each of 4 bottom edges |

Notes:

Short description of Class IE13 (*For more information see standard IEC 60721-3-1)*

"Locations without controlled temperature and humidity, where heating may be used to raise low temperatures, locations in buildings providing minimal protection against daily variations of external climate, prone to receiving rainfall from carrying wind".

Short description of Class IE23 (*For more information, see standard IEC 60721-3-2)*

"Transportation in unventilated compartments and in conditions without protection against bad weather, in all sorts of trucks and trailers in areas of well developed road network, in trains equipped with buffers specially designed to reduce shocks and by boat".

Short description of Class IE35 (*For more information see standard IEC 60721-3-3)*

"Locations with no control on heat or humidity where heating may be used to raise low temperatures, to places inside a building to avoid extremely high temperatures, to places such as hallways, building staircases, cellars, certain workshops, equipment stations without surveillance".

Short description of Class IE73 (*For more information see standard IEC 60721-3-7)*

"Transfer to places where neither temperature nor humidity are controlled but where heating may be used to raise low temperatures, to places exposed to water droplets, products can be subjected to ice formation, these conditions are found in hallways and building staircases, garages, certain workshops, factory building and places for industrial processes and hardware stations without surveillance".

## 9.5 Conformity

The complete product complies with the essential requirements of article 3 of R&TTE 1999/5/EC Directive and satisfied the following standards:

| Domain | Applicable standard |
|---|---|
| Safety standard | EN 60950 (ed.1999) |
| Efficient use of the radio frequency spectrum | EN 301 419-(v 4.1.1)<br>EN 301 511 (V 7.0.1) |
| EMC | EN 301 489–1 (edition 2002)<br>EN 301 489-7 (edition 2002) |
| Global Certification Forum – Certification Criteria | GCF-CC V3.13.0 |
| FCC | FCC Part 15<br>FCC Part 22, 24 |
| IC | RSS-132 Issue 2<br>RSS-133 Issue 3 |

# 10 Connector and Peripheral Devices References

## 10.1 General Purpose Connector References

GPC is a 50-pin plug connector with 0.5mm pitch from Kyocera Elco:

14 5078 050 515 861+




Mini USB connector with 0.8mm pitch from Molex:

54819-0572




16 Way I/O Socket with 0.625mm pitch from Kyocera Elco:

20 9257 016 001 013 (IESM side)




16 Way I/O plug with 0.625mm pitch from Kyocera Elco:

58-9257-000-000-012S

More information is also available from;

http://www.avxcorp.com/

http://www.molex.com/

# 11 Safety recommendations

## 11.1 General Safety

It is important to follow any special regulations regarding the use of radio equipment due in particular to the possibility of radio frequency (RF) interference. Please follow the safety advice given below carefully.

Switch OFF your Wireless CPU®:

- When in an aircraft. The use of cellular telephones in an aircraft may endanger the operation of the aircraft, disrupt the cellular network and is illegal. Failure to observe this instruction may lead to suspension or denial of cellular telephone services to the offender, or legal action or both,
- When at a refueling point,
- When in any area with a potentially explosive atmosphere which could cause an explosion or fire,
- In hospitals and any other place where medical equipment may be in use.

Respect restrictions on the use of radio equipment in:

- Fuel depots,
- Chemical plants,
- Places where blasting operations are in progress,
- Any other area where signalization reminds that the use of cellular telephone is forbidden or dangerous.
- Any other area where you would normally be advised to turn off your vehicle engine.

There may be a hazard associated with the operation of your Supreme Plug & Play close to inadequately protected personal medical devices such as hearing aids and pacemakers. Consult the manufacturers of the medical device to determine if it is adequately protected.

Operation of your Supreme Plug & Play close to other electronic equipment may also cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

The Supreme Plug & Play is designed for and intended to be used in "*fixed*" and "*mobile*" applications:

- "*Fixed*" means that the device is physically secured at one location and is not able to be easily moved to another location.
- "*Mobile*" means that the device is designed to be used in other than fixed locations and generally in such a way that a separation distance of at least 20 cm (8 inches) is normally maintained between the transmitter's antenna and the body of the user or nearby persons.

The Supreme Plug & Play is not designed for and intended to be used in portable applications (within 20 cm or 8 inches of the body of the user) and such uses are strictly prohibited.

## 11.2 Vehicle Safety

Do not use your Supreme Plug & Play while driving, unless equipped with a correctly installed vehicle kit allowing 'Hands-Free' Operation.

Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.

If incorrectly installed in a vehicle, the operation of Supreme Plug & Play telephone could interfere with the correct functioning of vehicle electronics. To avoid such problems, make sure that the installation has been performed by a qualified personnel. Verification of the protection of vehicle electronics should form part of the installation.

The use of an alert device to operate a vehicle's lights or horn on public roads is not permitted.

## 11.3 Care and Maintenance

Your Supreme Plug & Play is the product of advanced engineering, design and craftsmanship and should be treated with care. The suggestion below will help you to enjoy this product for many years.

Do not expose the Supreme Plug & Play to any extreme environment where the temperature or humidity is high.

Do not use or store the Supreme Plug & Play in dusty or dirty areas. Its moving parts (SIM holder for example) can be damaged.

Do not attempt to disassemble the Wireless CPU®. There are no user serviceable parts inside.

Do not expose the Supreme Plug & Play to water, rain or spilt beverages. It is not waterproof.

Do not abuse your Supreme Plug & Play by dropping, knocking, or violently shaking it. Rough handling can damage it.

Do not place the Supreme Plug & Play alongside computer discs, credit or travel cards or other magnetic media. The information contained on discs or cards may be affected by the Wireless CPU®.

The use of third party equipment or accessories, not made or authorized by Wavecom may invalidate the warranty of the Wireless CPU®.

Do contact an authorized Service Center in the unlikely event of a fault in the Wireless CPU®.

## 11.4 Your Responsibility

This Supreme Plug & Play is under your responsibility. Please treat it with care respecting all local regulations. It is not a toy. Therefore, keep it in a safe place at all times and out of the reach of children.

Try to remember your Unlock and PIN codes. Become familiar with and use the security features to block unauthorized use and theft.

# 12 Recommended Accessories

Accessories recommended by Wavecom for the IESM-IO+USB+GPS are given in the table below.

Table 17: List of recommended accessories

| Designation | Part number | Supplier |
|---|---|---|
| GPS antenna with MMCX connector | | |

# 13 Online Support

Wavecom provides an extensive range on online support which includes the following areas of Wavecom's wireless expertise:

- the latest version of this document
- new versions of our Operating System user guides
- comprehensive support for Open AT®
- regulatory certifications
- carrier certifications
- application notes

To gain access to this support, simply visit our web site at www.wavecom.com and click on "Support". Privileged access via user login is provided to Wavecom authorized distributors.

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